

BLINDED BY DOCTRINE: LESSONS LEARNED FROM THE LUFTWAFFE

BY

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ABSTRACT

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This paper will conduct an analysis of the failure of the Luftwaffe (1939-45) and identify practices for the United States Air Force to avoid. The analysis will address lack of vision and institutional inflexibility in crafting airpower doctrine, as well as explore the ensuing systemic mismatch of doctrine and strategy that characterized the performance of the Luftwaffe in World War II. The primary factor was Germany's decision to develop a tactical air force lacking strategic effect. This choice would yield dire consequences once Luftwaffe leaders found themselves in a prolonged war of attrition while remaining persistently committed to airpower doctrine designed for rapid, decisive combat operations pursuing a strategy of annihilation. The study of this failure may identify areas the United States Air Force should avoid in the formulation of doctrine to meet projected airpower challenges in the operational environment of the 21st century. Simply, in the current volatile strategic environment, the United States Air Force must adapt relevant doctrine and pursue flexible transformation to meet the unconventional threat at hand while maintaining America's dominance against traditional challenges.

BLINDED BY DOCTRINE: LESSONS LEARNED FROM THE LUFTWAFFE

The study of history is paramount; it is where we look for lessons learned in past mistakes and triumphs of our own experiences and those of others. We look to the past to avoid these pitfalls as we constantly seek to improve our circumstances. Countries develop national objectives to guide their actions; they also develop subordinate military doctrine and ensure the acquisition of proper resources to pursue strategic political goals. Should military doctrine be mismatched with strategic level objectives, however, history reveals that dire consequences may result. A review of the German Luftwaffe during World War II will well illustrate this point. First, this study will look at the development of the Luftwaffe's doctrine, exploring why and how it was developed and the unwillingness to change doctrinal assumptions once invalidated as the early success began to erode due to the increased duration of World War II. Secondly, we will examine how the Luftwaffe mismanaged their resources of aircraft and manpower in the service of military doctrine that was becoming increasingly irrelevant as a war of annihilation transformed into a protracted war of attrition. These lessons can help guide current United States Air Force leadership as it seeks to develop relevant airpower doctrine that best utilizes finite resources in the most effective and efficient manner. We must have the vision to predict what the future threats are, continue to review our air doctrine to counter threats to our national interests, maintain required trained manpower, and acquire the type of equipment necessary with funding limitations to best counter a wide range of threats and various intensities of missions our airmen will face in the future.

The powerful German war machine that appeared unstoppable in 1939 through 1941 was unable to defend their homeland by late 1944. The Luftwaffe lost air superiority and was powerless to stop the allied bombing efforts that reduced German aircraft production by 31 percent and tank production by 35 percent. Rivalry between Nazi Party leaders and a military hierarchy critical of new technology greatly hindered mass production operations and the ability to take advantage of new weapons. As a result, the German war machine fought most of World War II with proven but dated technology from the 1930s. In 1944, the Allies were fully motorized; Germany still employed over 1.25 million horses.¹ The downfall of the German war machine-- especially the Luftwaffe -- was a direct result of holding onto a doctrine that became increasingly flawed as World War II developed into a long sustained war, exactly what their doctrine was originally designed to avoid.

Germany's doctrine of warfare prior to World War II followed a logical conclusion drawn from their most recent experiences from World War I, in which the nation was subjected to a long protracted war of attrition and stalemate. Despite the implementation of revolutionary infantry and artillery doctrine in 1918, Germany's ground forces were unable to achieve operational-strategic effect prior to ultimate defeat. During the interwar period, however, Germany developed a revised maneuver doctrine that added dedicated airpower to the combined arms team. New mechanized ground forces, combined with tactical air support, would now permit operations so rapid that field forces and reserve echelons could be quickly destroyed, thereby achieving victory before the enemy fully mobilized national assets for war. Germany's new Blitzkrieg ("Lightening War") of fast paced air-ground operations and initial victories in

the war represented the culmination of this new doctrine to achieve political effect through a strategy of annihilation.

The Versailles Treaty, signed after World War I, severely limited aircraft production and research within Germany. Germany was determined to remain current with advancing aircraft technology and, as a result, key aircraft manufacturing companies simply moved outside of Germany into neighboring countries to continued research and development. From 1925 to 1933, Germany allocated a modest 10 million marks annually for aircraft purchases. Germany also began relocating their aircraft manufacturing companies back to Germany as they concentrated on the development of training, sport and heavy transport type aircraft which could easily be utilized in the development of trainers, fighters, and bomber type aircraft.² These aircraft were procured for an offensive air force that could be used in direct support of ground operations.

Germany's preparation for war in the 1930s was massive compared to British and French preparations. Germany committed 35 percent of its industrial production capability to war material while Britain's was seven percent and France contributed just five percent of industrial capability to war materials. By 1939, the Germany navy had a respectable sea power consisting of nine battle cruisers and 26 submarines, the German ground forces had increased their armor capability as the principal component of Blitzkrieg doctrine, coupled with the development of a modernized tactical air force. The Luftwaffe did not grow significantly in the 1930s, however; the acquisition of technologically advanced aircraft such as the Ju-87 Stuka, Messerschmitt Me-109, and the Heinkel He-111 -- coupled with combat experience gained in Spain -- set the stage

for Germany's success in quickly obtaining air superiority throughout Europe once war came.³ As air superiority is gained by fighters, it permits attack and tactical dive bombers to fully support ground operations in the attack. This doctrine of rapid, decisive maneuver operations was the vision Germany pursued in the aftermath of World War I; the resulting strategic miscalculation, however, led to another war of attrition and left Germany with an airpower doctrine ill-suited to the new strategic environment the nation faced after 1941.

General Hans von Seeckt was the German General Staff representative during the Versailles Peace conferences. Seeckt was a firm supporter of airpower who fought unsuccessfully to keep Germany's air force intact after World War I. Seeckt's key air advisor was Captain Helmut Wilberg who outlined the future requirements of the German air force. Wilberg would go on to become Germany's top ranking officer in the German air service. Seeckt also knew Captain Erhard Milch, who was a pilot and squadron commander during World War I under Wilberg. Milch left the military in the 1920s to pursue a career in the infant airline industry where he greatly improved long-range operations of transportation aircraft.⁴ Milch gained valuable knowledge in the commercial airline industry and his talents would be invaluable to German war efforts as a top official in the Luftwaffe.

In 1935, Wilberg, now a general in Germany's Air Ministry, produced Luftwaffe Regulation 16. Wilberg was slated to be the first Luftwaffe Chief of Staff, but he was part Jewish and Nazi officials would not permit him to retain a top leadership position. Therefore, Germany's first Luftwaffe Chief of Staff was General Walther Wever, a non-flyer but great supporter of airpower. He enthusiastically started a program to research

the development of a large four-engine bomber that was very unpopular with the balance of top Luftwaffe leadership. The cadre of Luftwaffe leadership had extensive practical airpower experience from World War I, albeit mostly from fighter operations. Their experience with bombers was not favorable as reflected in subsequent doctrine that advocated offensive fighter/attack aircraft in support of ground forces over the development of a strategic bomber capability. Germany's air doctrine was conceived to support ground forces using rapid tactical maneuver on the battlefield to avoid the mistake of World War I.⁵

In 1934, the Luftwaffe began to develop its air doctrine. General Wever pursued his personal vision of building a strategic air force with a strong bomber arm. The development of Wever's vision involved more of an interdiction mission for the Luftwaffe, designed to win a campaign not a war, rather than true strategic bombing as conceptualized by the Anglo-Americans. His thought was if successful in multiple campaigns, victory in war would follow. The Luftwaffe would work in cooperation with the ground forces and target enemy infrastructure to slow an enemy's response, while simultaneously terrorizing cities and industrial regions. The early doctrine of the Luftwaffe included rapid air superiority, attacking enemy airfields, and those industrial targets that were in direct support of war efforts. It envisioned a quick powerful blow to quickly gain advantage and achieve strategic effect. Germany viewed the industrial capabilities of a country as vital strategic targets, but was unwilling to allocate adequate airpower against such targets. Germany's goal was to win a quick war of annihilation. The limitation of this doctrine is well illustrated in the availability of spare parts in late

1938: "the supply staff doubted whether the Luftwaffe could have fought for more than four weeks."⁶ Germany was ill prepared for a long war.⁷

With the death of General Wever in 1936, the development of German airpower doctrine became firmly committed to the support of ground operations. Strategic bombing consequently was relegated to a secondary priority. The doctrine for the Luftwaffe was institutionalized by General Wilberg in Luftwaffe Regulation 16:⁸

Luftwaffe Regulation 16, The Conduct of Air Operations (Luftkriegsführung)-issued in 1935, served as the primary expression of Luftwaffe battle doctrine into World War II. Six major missions of the Luftwaffe were outlined in Regulation 16: (1) combat action to achieve and maintain air superiority; (2) combat and other action in support of ground troops; (3) combat and other action in support of the navy; (4) action to interdict routes of enemy communication and supply; (5) strategic operations against sources of enemy power: and (6) attacks against targets in cities - that is, centers of government administration and control.⁹

In 1935, General Ernst Udet was appointed by Hitler to be responsible for the production and development of aircraft for the Luftwaffe. This was a blunder by Hitler; the real talent in aircraft design was Erhard Milch, who was the ex-director of Lufthansa airline. Udet was poorly suited for the task he was assigned. Udet was a fighter pilot during World War I and a stuntman who often tested new aircraft and pushed them to their limits. He was insistent that all bombers, to include four engine bombers, had the capability to conduct dive bombing in support of ground operations. This requirement hindered the development and design of German aircraft in the late 1930s, particularly in the heavy bomber category. Udet's lack of strategic vision stifled the potential roles large bombers would have in the Luftwaffe. The requirement for each aircraft to do dive bombing created a strain on aviation designers. Production of older aircraft slowed in favor of new models, thereby resulting in a lull in operational aircraft production

throughout the early war years. As a result, Germany was stuck throughout much of the war with the same aircraft they entered the war with in 1939.¹⁰

The Luftwaffe leadership failed to develop a vision for a long air war that included strategic bombing, as they were convinced the doctrine of rapid operations would always be successful in the annihilation of the enemy. Germany's doctrine therefore supported a swift defeat of the enemy on the battlefield in a war of quick annihilation. It can be suggested that Germany lacked a grand strategy. In 1939 through 1941, Germany could be guilty of having " 'victory disease' ", they thought they could not be defeated.¹¹ Although initially successful in winning several quick victories over Poland, France and driving deep into Russia, Germany was not prepared for a long war. As the war lengthened and the fighting proved continuous, Germany failed to reassess its doctrine -- or to prioritize how the Luftwaffe would use limited resources for aircraft production, employment and trained pilots in a war of attrition. Instead, the Germans became overwhelmed by a new strategic environment that their original military doctrine was designed to avoid.¹²

From 1941 through 1945, the German army and Luftwaffe fought a protracted war of attrition on the eastern front against the Soviets. At the start of hostilities, Germany had 2,500 aircraft available and by 1944 the Luftwaffe fielded just 1,700 aircraft on the entire eastern front. Germany's doctrine was contributing to their failure. Germany failed to plan for the long war; they grossly underestimated the cost, and the production capabilities of their enemies. Moreover, the German war machine lacked standardization that strained the maintenance of equipment and increased logistical demands in both ordering proper parts and the physical distribution of resupply.¹³

The German war machine was organized for a swift moving battle. The rapid advancement of ground forces was deliberately designed to annihilate any foe and to avoid prolonged operations; Germany desired to fight a quick war of annihilation over a long war of attrition. In battle, the Luftwaffe was very quick to utilize newly acquired airfields; they would have air operations launching aircraft generally with 24 hours of taking over an airfield. For example, by keeping airpower close to the front during the invasion of France, German pilots were able to fly four to six missions per day compared to French pilots who averaged just one sortie per day. The German tactic, in support of their doctrine, was to throw all available resources into the fight and the repair of equipment could be completed after the conclusion of operations. The Luftwaffe was able to operate most efficiently in this rapid mobile doctrine because the ground crews were logistically light and by design lacked the ability to repair their aircraft; ground crews did little more than basic mission preparation of refueling and rearming of aircraft. All repairs and major overhaul of engines was to be completed back at the factory in Germany after the fighting was over. This was a great cost saver in time and logistics for the operational units, but it also forced them to fight below strength while aircraft were waiting to be repaired. It was not an efficient method, though effective for the short duration. The logistics of transporting an un-flyable aircraft, even the small tactical fighters and attack aircraft, was obviously challenging.¹⁴

As the war progressed with Russia, the Luftwaffe continued to encounter further logistical challenges not only with transportation of aircraft in need of repair but in keeping the forces supplied and on the go. The vast land mass of Russia proved to be a test for a military force designed for a quick victory. The logistical lines in Russia were

tenfold of those Germany faced while fighting in France. Valuable war material was being consumed by the logistical operations that were to supply front fighting forces. The Russian countryside lacked the number of roads and quality the Germans used in their western campaigns. Compounding the issue was that the rail system in Russia was a different gauge than those used in Germany. These logistical oversights left the Luftwaffe at an operational level of 30 percent by December 1941. The operational level of the Luftwaffe remained between 50-60 percent throughout the war while Allied serviceability of aircraft was 70-80 percent and the Allies had far greater numbers. This was directly related to Germany's doctrine for a war of quick annihilation, the inability to complete basic repairs in the field, and their unwillingness to change the organization to permit the capability of ground crews to complete simple repairs. It is estimated that in 1944, up to 33 percent of Luftwaffe aircraft were lost due to abandonment that required only very simple repairs or replacement of parts. Long term sustainment simply was inconsistent with Luftwaffe doctrine; and these doctrinal issues were beginning to impact the war fighting capabilities of the force.¹⁵

On the eastern front, during the early years, it was Germany's bombers and attack aircraft that greatly assisted the ground forces in pushing the Soviets back deep into their own country. As the war turned inevitably against Hitler and the homeland became threatened, Germany produced more fighters to improve the defense. In 1942, the majority of aircraft produced by Germany were bombers; by 1944 bombers represented 18 percent of Germany's aircraft production. Luftwaffe leaders continued to look for a single knockout blow to stop the Allied bombers, thereby indicating a continued reluctance to alter doctrine seeking annihilation despite a clear change in the

strategic environment to attrition. As Germany lost air superiority over Europe, the stage was set for Allied strategic bombing to further destroy industrial targets, war material, and infrastructure as the Allies increased the attritional ante.¹⁶

The massive waves of Allied strategic bombers, particularly during daylight, offered a target rich environment for the Luftwaffe. The Allied fighter escorts were tethered to the bombers to protect them. Once the restrictions on fighters were loosened and they were permitted to pursue German fighters, the long air war of attrition began. The Americans fighters slowly but deliberately gained air superiority over Europe in a long air battle. The result was “ensuring Allied planes could roam the European Continent with relative impunity.”¹⁷ On January 1, 1944, General ‘Hap’ Arnold, American Air Force Commander-in-Chief sent a message to commanders in Europe: “Destroy the enemy Air Force wherever you find them in the air, on the ground and in the factories.”¹⁸ This shift in Allied commander’s intent placed decisive pressure on the Luftwaffe. To counter the threat, the Luftwaffe pulled fighters from Russia to defend Germany against increased Anglo-American “seek and destroy” operations. The Luftwaffe was forced into a battle for air superiority over the homeland and clearly into a terminal air war of attrition.

The German war machine was also greatly strained for oil and fuel; their newly motorized ground forces regressed to horse-drawn carts to move their equipment. The Luftwaffe felt the impact of fuel shortages the most. The Luftwaffe was a huge consumer of fuel for operations and training programs. The flight training hours for student pilots was constantly diminishing. German pilots were thrust into combat lacking experience, and this had an obvious negative impact on the morale of the

Luftwaffe. The senior pilots with experience were not utilized to teach new students proper tactics that worked and were current. Instead, the Luftwaffe chose to use their most seasoned aircrews in combat until they were lost, again a doctrine driven practice that was shortsighted and designed for a quick victory.¹⁹

By mid 1944, the air war over Europe consisted of Allied aggressive bombing and the Germans were in a defensive mode, a new role for the Luftwaffe that was designed to support offensive ground operations. Germany's airpower was removed from front line operations on the eastern front and withdrawn to defend the heartland against the British and American bombing campaign.²⁰ The Allied invasion of Europe in June 1944 was supported by more than 12,000 aircraft, of which 5,600 were fighters. The Luftwaffe could only assemble 170 airplanes to support the defense and attack the invasion force. In response to the invasion, many of the German pilots were pressed into operations lacking the proper training; this led to poor results for the Luftwaffe as the Allied advanced from air superiority to air supremacy over Europe. The ill-trained Luftwaffe pilots faced overwhelming odds; and the inevitable cost in attrition collapsed Germany's air defense.²¹

Statistics well illustrate the grim reality. The Luftwaffe lost 21 percent of their fighter force in November 1943 and 23 percent in December 1943. The production of German aircraft dropped from 873 aircraft in July 1943 to 663 in December 1943. Conversely, American fighter strength quadrupled in an eight month period. The ratio of German to Allied fighter strength fell to 1:7 in four months; Germany lost over 1,000 aircraft along with the nation's best pilots. The void of aircraft and -- more importantly -- skilled pilots could not be filled by the Luftwaffe. By April 1944, Germany had 500

single engine fighters on the eastern front and 300 on the western front against 13,000 Soviet aircraft and 12,000 Allied aircraft. As the Allies gained air superiority, fighter/attack aircraft were free to conduct ground attacks. The Allies destroyed 9,000 German aircraft on the ground. Air superiority turned to air supremacy as German industry, infrastructure, and transportation targets were relentlessly attacked by the Allies.²²

The lack of fuel to train pilots forced the Luftwaffe to send inexperienced pilots into battle. The results were disastrous; in the first five months of 1944, the Luftwaffe lost 20 percent of its pilots each month. By 1944, the Luftwaffe was comprised of very inexperienced pilots lacking basic combat skills. The Luftwaffe policy, in line with their doctrine, was to leave their experienced pilots in frontline units. Consequently, years of combat eroded the numbers of best pilots down to very low levels. These combat experienced pilots may have been better utilized as instructors to pass on skills and tactics learned and used successfully in earlier years. By late 1944, the attrition of Luftwaffe pilots who flew in 1940 had left only a handful of experienced pilots. The skill level of the Luftwaffe was divided therefore into those who were very inexperienced, and the very few who were exceptionally skilled.²³ The failure of Germany to capitalize on the experience of their highly skilled pilots was a failure to prioritize the continuous demands of the war. Five years into the war, Germany was still unwilling to change their policy on pilot rotation from combat to training centers.

By the late 1944, 80 percent of Germany's fighters were operating in defense of Germany. Germany's entire doctrine of offensive air in support of Blitzkrieg operations was turned inside out as they struggled to defend against the Allied heavy bombers.

The German defense lacked the aircraft, skilled pilots, and fuel to battle the Allies who gained air supremacy. The German ground forces fought the last two years of the war without air support, a major component of the Blitzkrieg doctrine.²⁴ The last Luftwaffe Chief of Staff, General Karl Koller, when asked why he thought Germany lost the war, simply replied, "what was decisive in itself was the loss of air supremacy."²⁵

Germany possessed some the most advanced aircraft and aircraft technology in 1939. This technological advantage in design continued during the following six years, but the Luftwaffe leadership failed to capitalize on these opportunities as they remained too focused on the task at hand, to win the current war and to do it quickly.²⁶ The Luftwaffe's inability and unwillingness to modify airpower doctrine as traditional methods became increasingly obsolete rest at the very foundation of strategic failure in World War II.

Luftwaffe doctrine developed for a quick war of rapid annihilation was sound, but once the strategic environment morphed into a war of attrition, the Luftwaffe's tactical air force committed to supporting the ground forces became obsolete. The Luftwaffe was not designed or resourced to sustain a long war. The collapse of the Luftwaffe and its inability to protect the German people, industry and infrastructure stems directly from leadership's reluctance to modify airpower doctrine to meet new strategic imperatives -- a lesson increasingly relevant to the current debate on the future of the United States Air Force.²⁷

In the current volatile environment, the United States Air Force must have the vision to get doctrine correct the first time and to maintain America's air supremacy for the uncertain high conventional threats. If we get it wrong, we may not get a second

chance to get it right. For this reason the air force doctrine of global reach, global power, and global vigilance advocates dominance in all areas. The doctrine of the United States Air Force is developed for long sustained domination, a lesson learned from the shortfall of the Luftwaffe's doctrine. By having these capabilities the air force can obtain air supremacy that permits follow on operations, including air interdiction, air transportation, freedom of movement and support of ground forces and operations of low tech unmanned aerial vehicles. The United States Air Force has sustained a dominate force for the benefits of air superiority since 1945. This is due to learning from past experience and having the vision to look forward to sustain a technological advantage over potential adversaries.

The United States Air Force is well aware that a technological advantage over a foe is vital, particularly in air operations. American airpower cannot afford to drop behind any country in technological advantages; as a result airmen are unapologetic when they seek the most advanced equipment available in the world. By operating the most advanced equipment the air force can dominate the air; if the equipment is obsolete, the time required to develop new aircraft is so great that airpower advantages will be lost. For the United States Air Force to maintain air dominance, that permits our ground force to operate without concern of being attacked from the air, air leaders must seek and acquire the most advanced systems that place the service well in front of any potential opposition as far as equipment and training. As the United States Air Force acquires weapons systems, leaders need to ensure they will be able to maintain a marked advantage over any potential enemy and be able to be dominate in the full spectrum of combat operations²⁸

The Department of Defense planning and budget process is purposely designed to be a slow, deliberate procedure. It must review methodically long term strategic needs of the military based on national policy and strategy. Military forces are not assembled and trained quickly; it takes a significant amount of time and funding to have any substantial force mission ready. Once employed, the force must be rested, trained and re-equipped prior to subsequent employments. The high technological equipment many military units utilize that allows them great success on the battlefield also takes time to develop, some as long as ten years.²⁹

While the United States Air Force clearly has a time tested vision of how it should dominate the conventional air war environment, leaders must also be willing and able to look at the current threat on hand and evaluate doctrine to determine if it is the best match to achieve desired strategic effect. This requirement to change and transform was reconfirmed in a speech by Secretary of Defense Robert M. Gates during an address to students at the Air War College on April 21, 2008. Secretary Gates encouraged forward thinking and emphasized that air leaders must be prepared to expect radical change and be willing to implement and support doctrinal change within the air force to meet the threats on hand, as opposed to remaining solely focused towards “winning the big battles in the big wars.”³⁰ He further stated, “we must always guard against falling into past historical patterns where, if bureaucratic nature takes its course, these kinds of irregular capabilities tend to slide to the margins.”³¹ As the air force looks at current threats and new priorities, the training, doctrine, and procurement process should be reviewed to enable our forces to engage in irregular warfare. Leaders must be willing to seek out cheaper and low-tech options that allow the air

force to complete reconnaissance and battlefield support to ground forces, in addition to traditional missions of achieving air dominance.³²

A perception of inflexibility and unwillingness to change was among contributing factors prompting Secretary Gates to ask for the resignations of the Air Force Secretary and Chief of Staff in June 2008. Looking to the future with a vision towards the next threats and how to counter them is extremely important to national security; it is a top priority for the air force, but it is not the only priority. The threat at hand also must be addressed. The air service cannot get so focused on the long term projected strategic environment and traditional doctrine that it stumbles on the short term threats and concerns at hand. Secretary Gates was critical of the United States Air Force and the United States Navy when he cautioned those services to avoid “ ‘Next-War-itis’...to be in favor of what might be needed in a future conflict.”³³ The current conflicts require full attention from all of the armed forces, not just ground forces.³⁴ A willingness to change and address threats at hand -- particularly when other services require assistance -- is essential in maintaining a viable doctrine, something the German Luftwaffe failed to learn.

Our current air force has learned from the past mistakes of the Luftwaffe, even as the United States Air Force enjoys total air supremacy in the current war, it seeks continuous transformation and improvement in aircraft and tactics. The air force has recently acquired the C-17 for heavy airlift, seeks to obtain a new tanker for in-flight refueling, as well as the FA-22 and the Joint Strike Fighter. These represent the most advanced aircraft in the world, but the United States Air Force is also looking at a low tech prop driven OA-X aircraft, a radical departure from current advanced technology.

The OA-X would be used for irregular warfare and well suited for hybrid warfare missions. The OA-X could be used in an area with very low to no air threats; the cost of 24 OA-Xs is less than the cost of two FA-22s, and the operating cost is \$1,000 per hour compared to \$7,750 per hour to operate an F-16.³⁵ This clearly demonstrates that the air force is willing to explore other options and methods to complete the mission.

As early as 2002, then Secretary of Defense Donald H. Rumsfeld envisioned that a high tech force, fully capable of dominating in a high intensity conventional war, was not enough; instead, the method of employment and existing doctrine must be continually reviewed and revised to meet the current threat at hand. "We need to change not only the capabilities at our disposal, but also how we think about war. All the high tech weapons in the world will not transform the U.S. armed forces unless we also transform the way we think... and the way we fight."³⁶

Endnotes

¹ Richard Overy, *Why the Allies Won* (New York, NY: W.W. Norton & Company, 1997), 5.

² James S. Corum, *The Roots of Blitzkrieg* (Lawrence, KS: University Press of Kansas, 1992), 166.

³ David Clay Large, *Between Two Fires Europe's Path in the 1930s* (New York, NY: W.W. Norton & Company, 1990), 362.

⁴ Corum, *The Roots of Blitzkrieg*, 150.

⁵ Ibid., 167, 168.

⁶ Williamson Murray, *German Military Effectiveness* (Baltimore, MD: The National Aviation Publishing Company of America), 62.

⁷ Ibid., 42-43, 62, 92.

⁸ Corum, *The Roots of Blitzkrieg* 164, 167.

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- ¹⁰ Overy, *Why the Allies Won*, 217-220.
- ¹¹ Colin S. Gray, *Modern Strategy* (New York: Oxford University Press Inc., 1999), 99.
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